10CFR50.73

A subsidiary of Pinnacle West Capital Corporation

Palo Verde Nuclear Generating Station

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102-05471-CE/SAB/DJS
April 25, 2006

ATTN: Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS) Unit 2
Docket No. STN 50-529
License No. NPF-51
Licensee Event Report 2003-001-01

Attached please find a supplemental Licensee Event Report (LER) 50-529/2003-001-01 prepared and submitted pursuant to 10 CFR 50.73. This LER reports the Unit 2 manual reactor trip and related events which occurred on July 29, 2003.

The corrective actions described in this LER are not necessary to maintain compliance with regulations and therefore, Arizona Public Service Company makes no NRC commitments in this correspondence. In accordance with 10 CFR 50.4, a copy of this LER is being forwarded to the NRC Region IV Office and the Senior Resident Inspector. If you have questions regarding this submittal, please contact James A. Proctor, Section Leader, Regulatory Affairs, at (623) 393-5730.

Sincerely,

CE/SAB/DJS/ca

Attachment

cc: B. S. Mallet, NRC Region IV Administrator
M. B. Fields, NRC NRR Project Manager
G. G. Warnick, NRC Senior Resident Inspector for PVNGS

IE22

NRC FORM 366 (7-2001)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 7-31-2004

Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Palo Verde Nuclear Generating Station Unit 2	05000529	1 OF 8

4. TITLE

Reactor Trip with Loss of Forced Circulation Due to Failed Pressurizer Main Spray Valve

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
										05000
07	29	2003	2003	- 001	- 01	04	25	2006	FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE	1
10. POWER LEVEL	98

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)

20.2201(b)	20.2203(a)(3)(ii)	50.73(a)(2)(ii)(B)	50.73(a)(2)(ix)(A)
20.2201(d)	20.2203(a)(4)	50.73(a)(2)(iii)	50.73(a)(2)(x)
20.2203(a)(1)	50.36(c)(1)(i)(A)	X **50.73(a)(2)(iv)(A)**	73.71(a)(4)
20.2203(a)(2)(i)	50.36(c)(1)(ii)(A)	50.73(a)(2)(v)(A)	73.71(a)(5)
20.2203(a)(2)(ii)	50.36(c)(2)	50.73(a)(2)(v)(B)	OTHER - Specify in Abstract below or in NRC Form 366A
20.2203(a)(2)(iii)	50.46(a)(3)(ii)	50.73(a)(2)(v)(C)	
20.2203(a)(2)(iv)	50.73(a)(2)(i)(A)	50.73(a)(2)(v)(D)	
20.2203(a)(2)(v)	50.73(a)(2)(i)(B)	50.73(a)(2)(vii)	
20.2203(a)(2)(vi)	50.73(a)(2)(i)(C)	50.73(a)(2)(viii)(A)	
20.2203(a)(3)(i)	50.73(a)(2)(ii)(A)	50.73(a)(2)(viii)(B)	

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
James A. Proctor, Section Leader, Regulatory Affairs	623-393-5730

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX		CAUSE	SYSTEM	COMPONENT	MANU FACTURER	REPORTABLE TO EPIX
B	AB	FCV	F130	YES						

14. SUPPLEMENTAL REPORT EXPECTED			15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X	NO				

16. ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On July 29, 2003, at 1500 Mountain Standard Time (MST), Unit 2 was at approximately 98% power when pressurizer main spray valve RCE-100F failed in the full open position. Attempts to close the valve per the alarm response procedure were unsuccessful. At 1515 MST, control room personnel manually tripped the reactor. In accordance with the applicable alarm response procedure, control room personnel secured the reactor coolant pumps (RCPs) to stop the reactor coolant system (RCS) depressurization. Control element assemblies fully inserted into the reactor core. Safety related buses remained energized during and following the reactor trip.

Automatic safety injection and containment isolation actuation system (SIAS/CIAS) actuations occurred following the reactor trip, as RCS pressure continued to lower to the reactor protection system setpoint. The RCS was cooled on natural circulation with secondary heat removal via the main condenser. By 1616 MST, a containment entry was made and RCE-100F was manually isolated. At 1715 MST, RCP 1A was restarted restoring forced circulation to the reactor core. The event did not result in any challenges to fission product barriers and there were no adverse safety consequences as a result of this event.

There were no previous events that involved the same underlying cause within the last three years.

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Palo Verde Nuclear Generating Station Unit 2	05000529	2003	-- 001	-- 01	2 OF 8

17. NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)*

1. REPORTING REQUIREMENT(S):

Arizona Public Service Company (APS) is reporting this condition pursuant to 10 CFR 50.73(a)(2)(iv)(A) due to a manual actuation of the reactor protection system [EIIS: JC] on July 29, 2003. Similarly, notification was made to the NRC headquarters operation officer on July 29, 2003 (reference ENS # 40033) pursuant to 10 CFR 50.72(b)(2)(iv)(B).

2. DESCRIPTION OF STRUCTURE(S), SYSTEM(S) AND COMPONENT(S):

Pressurizer Spray Control Valves (RCE-100E/F) [EIIS: AB, FCV]

During normal operation, with reactor coolant pumps operating, pressurizer spray flowrate is controlled by two modulating (regulating), diaphragm operated spray control valves (Fisher valve model number 67-70 and the positioner model number is 3582G).

When in the automatic mode, these valves start to open at 2275 psia and are fully open at 2300 psia. The spray control valves can also be controlled manually in the control room. Pressurizer spray water is normally supplied from the cold leg reactor coolant pump (RCP) discharge of loops 1A and 1B. Having spray lines from both RCP discharge loops permits spray flow with less than four reactor coolant pumps operating. Differential pressure created by coolant flow through the reactor vessel normally provides the motive force necessary for spray flow.

Reactor Protection System (RPS)

The RPS provides for the rapid and reliable shutdown of the reactor to protect the core and the reactor coolant system pressure boundary from potentially hazardous operating conditions. Shutdown is accomplished by the generation of reactor trip signals. The trip signals open the reactor trip switchgear (RTSG) breakers [EIIS: AA], BRK), de-energizing the control element drive mechanism (CEDM) coils [EIIS: AA], allowing control element assemblies (CEAs) to drop into the core by the force of gravity.

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTAL NUMBER	REVISION NUMBER	
Palo Verde Nuclear Generating Station Unit 2	05000529	2003	-- 001	-- 01	3 OF 8

17. NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)*

Engineered Safety Features Actuation System (ESFAS)[EIIS: JE]

The ESFAS initiates necessary safety systems, based upon the values of selected unit parameters, to protect against violating core design limits and the Reactor Coolant System (RCS) pressure boundary during anticipated operational occurrences and ensures acceptable consequences during accidents.

The ESFAS contains devices and circuitry that generate Safety Injection Actuation Signals (SIAS) and Containment Isolation Actuation Signals (CIAS) (among others) when monitored variables reach levels that are indicative of conditions requiring protective action. A SIAS actuation will also start the emergency Diesel Generators (DG)[EIIS: EK]. If, during testing, a SIAS, containment spray actuation signal or auxiliary feedwater actuation signal occurs while the diesel generator is paralleled to the preferred power supply with its control switch in the REMOTE or LOCAL position, the diesel generator breaker will be automatically tripped by a momentary tripping pulse.

3. INITIAL PLANT CONDITIONS:

On July 29, 2003, at approximately 1500 Mountain Standard Time (MST), Palo Verde Unit 2 was in Mode 1 (POWER OPERATION), operating at approximately 98 percent power. There were no major structures, systems, or components that were inoperable at the start of the event that contributed to the event. There were no failures that rendered a train of a safety system inoperable and no failures of components with multiple functions.

Prior to the event, DG "A" was running in the "test" mode during a scheduled surveillance test (ST). Following the SIAS initiation, DG "B" started as required in the "emergency" mode and the DG "A" output breaker [EIIS: BRK] opened, as designed, upon receipt of the SIAS. Both DGs remained OPERABLE, running unloaded in the emergency mode as expected.

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTAL NUMBER	REVISION NUMBER	
Palo Verde Nuclear Generating Station Unit 2	05000529	2003	-- 001	-- 01	4 OF 8

17. NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)*

4. RELEVANT EVENTS CHRONOLOGY:

On July 29, 2003, at approximately 1425 MST, control room personnel (utility-licensed operators) returned RCE-100F to service upon completion of repairs to the valve's control system and applicable testing.

At 1500 MST, control room personnel received an alarm indicating that pressurizer pressure was decreasing due to pressurizer spray valve RCE-100F being full open. Control room personnel performed the first priority actions of the applicable alarm response procedure which included isolating the instrument air (IA)[EIIS: LF] to containment. RCS letdown was lost due to isolation of IA.

At 1515 MST, control room personnel, noting that the isolation of IA had not caused RCE-100F to close and that pressurizer pressure was continuing to decrease, initiated a manual reactor trip in accordance with the alarm response procedure. All CEAs inserted fully into the reactor core. Safety related buses remained energized during and following the reactor trip. All four RCPs were secured and control room personnel commenced applicable standard post trip actions (SPTAs). SIAS/CIAS automatically actuated. DG "A" output breaker tripped due to the SIAS/CIAS actuation.

At 1517 MST, control room personnel entered Limiting Condition for Operation (LCO) 3.4.5 RCS Loops—MODE 3, conditions A and C due to all four RCPs being secured.

At 1525 MST, control room personnel completed applicable SPTAs and the control room supervisor (CRS, utility-licensed operator) determined that plant conditions met a Loss of Forced Circulation (LOFC) event. SPTAs were exited and the LOFC emergency operating procedure (EOP) was entered.

At 1529 MST, control room personnel reviewed Emergency Plan procedure EPIP-01 and determined that no emergency action level event classifications were required for the event. Control room personnel entered LCO 3.4.9 Pressurizer, condition A due to pressurizer level exceeding 56%.

At 1542 MST, control room personnel exited LCO 3.4.9 condition A when pressurizer level was reduced below 56%.

At 1610 MST, control room personnel restored RCS letdown after the SIAS/CIAS.

By 1616 MST, other utility personnel entered containment and manually isolated RCE-100F by closing both its inlet and outlet valves.

At 1725 MST, control room personnel started RCP "1A" per applicable procedures and LCO 3.4.5 condition C was exited.

At 1746 MST, control room personnel started RCP "2A" per applicable procedures and LCO 3.4.5 condition "A" was exited.

At 1749 MST, control room personnel placed DG "A" in standby following the reset of SIAS/CIAS.

By 1808 MST, control room personnel had started both RCP 1B and 2B and EDG "B" had been placed in standby following the reset of SIAS/CIAS.

5. ASSESSMENT OF SAFETY CONSEQUENCES:

The minimum RCS pressure reached during the event was approximately 1792 pounds per square inch absolute (psia) (SIAS/CIAS setpoint is 1837 psia). RCS pressure reached a maximum of approximately 2264 psia after establishment of natural circulation. The minimum pressurizer level reached was approximately 30%. The decrease in RCS pressure and level is attributed to cooling caused by the opening of steam bypass control system (SBCS)[EIIS: JI] valves following the turbine trip. Letdown was lost during the event due to isolation of IA to containment and pressurizer level increased to approximately 59%. Control room personnel initiated a cool-down in accordance with the applicable emergency operating procedure to control pressurizer level.

Subsequent to the reactor trip the plant responded as designed. The reactor trip was uncomplicated, no safety limits were exceeded, and the event was bounded by current safety analyses. Primary and secondary pressure boundary limits were not exceeded as a result of the reactor trip. The transient did not cause any violation of the safety limits. Therefore, there were no adverse safety consequences or implications as a result of this event. This event did not adversely affect the safe operation of the plant or health and safety of the public.

The condition (RCE-100F full open) did not prevent the fulfillment of any safety function and did not result in a safety system functional failure as defined by 10CFR50.73(a)(2)(v).

6. CAUSE OF THE EVENT:

The direct cause of the event was RCE-100F's positioner balance beam was found disengaged from its pivot point and came to rest in a position that obstructed the positioner air vent. This obstruction prevented the venting of the positioner air relay, which then caused the maximum amount of air to be delivered to open the spray valve, overriding the close demand signal from the control room.

The root cause of the event was Air Operated Valve Services maintenance group work processes and procedures did not ensure worn and loose parts were detected and replaced prior to valve positioner failure. The combination of these worn and loose parts resulted in the valve positioner failing open in a manner that had not been seen at PVNGS or described in previously available operating experience and therefore was not anticipated.

No unusual characteristics of the work location (e.g., noise, heat, poor lighting) directly contributed to this event.

7. CORRECTIVE ACTIONS:

Control room personnel took immediate action to place the reactor in a stable condition in accordance with the applicable procedures.

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTAL NUMBER	REVISION NUMBER	
Palo Verde Nuclear Generating Station Unit 2	05000529	2003	-- 001	-- 01	7 OF 8

17. NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)*

Unit 1, 2 and 3 Fisher air operated valve positioners for the RCE-100 E and F main pressurizer spray valves were replaced with new positioners.

Applicable procedures were revised to require the monitoring of the main pressurizer spray valve operation prior to fully aligning these valves for RCS pressure control.

A checklist of specific attributes was added to the Air Operated Valve (AOV) Preventive Maintenance (PM) instructions for critical components and alignments in valve positioners and other control components to ensure valve control remains reliable.

8. PREVIOUS SIMILAR EVENTS:

In the past three years there have been no similar events where a Palo Verde Generating Unit experienced a reactor trip with Loss of Forced Circulation (LOFC) due to a failed pressurizer main spray valve.

9. ADDITIONAL INFORMATION:

Subsequent to the event, the shift technical advisor (STA) group did not promptly notify the System Engineering department that a safety injection had occurred as a result of the reactor trip (this delay was also noted by the resident NRC inspector).

During the post-trip plant performance evaluation, the initiation of the SIAS signal and RCS pressures were reviewed and it was noted that RCS pressure had lowered to 1792 psia (below the 1837 psia SIAS/CIAS setpoint). The STA group was initially not certain that an actual injection had occurred due to the lack of confirmatory flow indication and unknown piping head losses present at the time of the event. The subsequent review confirmed a safety injection had occurred and the initial NRC event notification was supplemented to reflect this finding.

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTAL NUMBER	REVISION NUMBER	
Palo Verde Nuclear Generating Station Unit 2	05000529	2003 --	001 --	01	8 OF 8

17. NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)*

Procedural enchantments were made to ensure that the total number of High Pressure Safety Injection (HPSI) nozzle thermal cycles does not exceed the Update Final Safety Analysis Report (UFSAR) limit without prior engineering evaluation. The current Unit 2 HPSI thermal cycle count was seven, with a procedural limit of 112 (70% of the UFSAR allowable cycles) before an Engineering evaluation is necessary. The HPSI cycle (injection) that occurred during this event has been taken into account by the System Engineering department through the corrective action program.